CLAIMS

1. A multi-parameter monitoring tool assembly, comprising:

a first sensor head configured with a plurality of ports, where the plurality of ports is configured to engage and interconnect with an interchangeable sensor head component, whereby the plurality of ports is sized to receive one end of the interchangeable sensor head component, and engagement and disengagement of the interchangeable sensor head component within the plurality of ports occurs through application of a linear force upon the interchangeable sensor head component; and

an electronics housing portion connectable to the first sensor head, wherein the electronics housing includes at least one electrical component configured to process signals generated by any of the interchangeable sensor head components engaged and interconnected with the first sensor head.

2. The tool assembly of claim 1 wherein the plurality of ports are each configured to receive and engage an insertable portion of the sensor component, wherein at least one radially compressive sealing device is disposed around the insertable portion.

3. The tool assembly of claim 2 wherein the plurality of ports includes first and second cylindrical portions, wherein the first cylindrical portion is configured to exit through an external surface of the first sensor head and include a first diameter, and the second portion is configured to begin a distance below the external surface and includes a second diameter larger than the first diameter, the plurality of ports being further configured such that upon insertion of the insertable portion through the first portion to the second portion, the radially compressive sealing device is configured to expand into the second portion creating a compressive force which resists withdrawal of the sensor component from the port.

4. The tool assembly of claim 2 wherein the first sensor head further includes at least one atmospheric pathway incorporated therein which interconnects the plurality of ports so as to distribute atmospheric gasses which may be compressed during engagement and interconnection of the interchangeable sensor head components in any of the plurality of ports.

5. The tool assembly of claim 1 wherein the interchangeable sensor head component may comprise at least one of: an interchangeable sensor and an accessory.

6. The tool assembly of claim 5 wherein the interchangeable sensor comprise at least one of: active and passive sensors configured to monitor at least one parameter.

7. The tool assembly of claim 6 wherein the at least one parameter include at least one of: conductivity, dissolved oxygen, pressure and/or turbidity, oxidation reduction potential (ORP), chloride, nitrate, chlorophyll, ammonium, and temperature.

8. The tool assembly of claim 5 wherein the accessory may comprise at least one of: a wiper device and a stirring device.

9. The tool assembly of claim 1 wherein the sensor head further includes at least one of: a threaded portion and at least one o-ring extending around a portion of the sensor head, for connecting with one or more portions of the electronics housing.

10. The tool assembly of claim 1 wherein the sensor head further includes a first circuit board device attached thereto, wherein the circuit board includes a plurality of electrical interconnection plugs mounted thereon for providing the interconnection with the interchangeable sensor head component.

11. The tool assembly of claim 10 wherein the plurality of ports pass from one side of the first sensor head to an opposing side, and the circuit board device is configurable to attach to the opposing side of the first sensor head in manner such that the interconnections plugs are positionable in each of the plurality ports and provide an environmental seal.

12. The tool assembly of claim 10 wherein the first circuit board device further includes at least one modular plug-in connection device mounted thereon for electrically connecting with other circuit card devices.

13. The tool assembly of claim 1 wherein the first sensor head is further configured to attach to an enclosure device, wherein the enclosure device comprises at least one of: a restrictor, calibration container, and a flow cell.

14. The tool assembly of claim 13 wherein the enclosure device is further configured to include a second sensor head mounted proximate to the first sensor head, wherein the second sensor head includes at least one port for receiving at least one of the interchangeable sensor head components, and the enclosure device is further configured with electrical connection means to conduct electrical signals from the second sensor

head to the first sensor head where the signals are further conductible to the electronic housing.

15. The tool assembly of claim 13 wherein the enclosure device is further configured to include an electrically controllable stirring device.

16. The tool assembly of claim 15 wherein the stirring device comprises a magnetic stirrer.

17. The tool assembly of claim 1 wherein the electronics housing comprises a plurality of housing layers.

18. The tool assembly of claim 17 wherein the plurality of housing layers comprise an inner housing and an outer housing.

19. The tool assembly of claim 18 wherein both the outer and inner housings are substantially cylindrical in shape, and the inner housing is configured to fit within the outer housing and both the inner and outer housing are configured to engage the first sensor head wherein a volume within the outer housing is environmentally sealed.

20. The tool assembly of claim 19 wherein the engagement of the outer housing and the first sensor head occurs through compression of at least one radially compressive sealing device encircling an exterior portion of the first sensor head against an inner surface of the outer housing, and engagement of the inner housing occurs through interaction of threaded portions on each of the inner housing and the first sensor head.

21. The tool assembly of claim 20 wherein the environmental seal is further provided through compression of a flat compression gasket positionable between one end of the outer housing and the first sensor head.

22. The tool assembly of claim 20 wherein the exterior portion of the first sensor head further includes a plurality of the radially compressive sealing devices disposed thereon and the inner surface of the outer housing further includes at least one groove positionable to partially receive one of the plurality of radially compressive sealing devices upon the engagement of the first sensor head and the housing so as to provide a resistive force to relative rotational movement of the sensor head and the outer housing.

23. The tool assembly of claim 19 wherein the outer and inner housings are further configured to engage a removable backshell so as to establish an environmental seal.

24. The tool assembly of claim 23 wherein the engagement of the outer housing occurs through compression of an radially compressive sealing device encircling an exterior portion of the removable backshell against an inner cylindrical surface of the outer housing, and engagement of the inner housing occurs through interaction of threaded portions on each of the inner housing and the removable backshell.

25. The tool assembly of claim 24 wherein the environmental seal is further provided through compression of a flat compression gasket positionable between one of end of the outer housing and the removable backshell.

26. The tool assembly of claim 24 further comprising at least one of:

the removable backshell configured for accessing replaceable batteries locatable within the electronic housing which are employed as a power source for the at least one electrical component; and

a data quick-connect device connectable and disconnectable to the removable backshell in manner which does not interrupt power to electronics locatable within the electronics housing, wherein the data quick-connect device provides a data connection to at least one remote location.

27. The tool assembly of claim 24 wherein the removable backshell includes first and second threaded portions, wherein the first threaded portion is employable for engaging a portion of the electronics housing and the second threaded portion is employable for engaging the data quick-connect device.

28. The tool assembly of claim 27 wherein an electrical connection between the removable backshell and the data quick-connect is established through application of a compressive force between a multiple elastomeric connector positionable within the removable backshell and a printed circuit board positionable within the data quick-connect.

29. The tool assembly of claim 1 wherein the electronics housing is further configured to enclose at least one circuit card assembly, wherein the circuit card assembly is further configured to electrically interconnect with electronic components

included on the first sensor head through use of a modular plug-in connector, a portion of which is incorporated in the at least one circuit card assembly.

30. The tool assembly of claim 29 wherein an inner diameter of the electronics housing in combination with the modular plug-in connector provide structural support for the at least one circuit card assembly.

31. The tool assembly of claim 29 wherein the at least one circuit card assembly includes an integrated barometer pressure sensor mounted thereon wherein the electronics housing further includes at least one atmospheric pathway incorporated therein for providing fluid communication to the atmosphere.

32. The tool assembly of claim 1 further comprising a computing unit including a processor and memory having stored therein instructions readable and executable by the processor, the computing unit being operably connectable with each of the interchangeable sensor head components.

33. The tool assembly of claim 32 wherein the interchangeable sensor head components comprise an interchangeable sensor and the computing unit is further configured to receive and process data signals generated by each of the interchangeable sensors.

34. The tool assembly of claim 33 wherein the computing unit is further configured to implement a test schedule stored in memory for each of the interchangeable sensors interconnected in the first sensor head.

35. The tool assembly of claim 34 wherein the computing unit is further configured to automatically amend the test schedule for each of the interchangeable sensors in response to changes in magnitude of received data signals from each of the plurality of replaceable sensors.

36. The tool assembly of claim 32 wherein the interchangeable sensor head components comprise an accessory and the computing unit is further configured to generate command signals for controlling operation of the accessory.

37. The tool assembly of claim 36 wherein the accessory is further configured with a memory device accessible by the computing unit for identifying the accessory.

38. The tool assembly of claim 31 which is further configured to detect insertion of the of interchangeable sensor head component in at least one of the ports and

to determine whether the particular port in which the interchangeable sensor has been inserted is configured to receive the particular interchangeable sensor head component.

39. The tool assembly of claim 33 wherein the computing unit is further configured to communicate with the interchangeable sensors which are configured with a memory device within which is stored identification and calibration information for the interchangeable sensor, and the computing unit is further configured to extract the identification and calibration information which is then employable in processing signals generated by the interchangeable sensor.

40. The tool assembly of claim 32 wherein the computing unit and each of the ports are electrically connectable with an unactivated circuit configured to generate measurement signals when the interchangeable sensor is engaged and interconnected in the at least one port, wherein each of the unactivated circuits includes at least one high impedance buffer for substantially eliminating stray currents.

41. The tool assembly of claim 1 which is further configured to be connectable to a communications network, wherein data signals may be exchanged between the tool assembly and at least one other device.

42. The tool assembly claim 41 wherein the communications network comprises at least one of: the Internet, public switched telephone network (PSTN), a wireless telephone network, and radio waves.

43. The tool assembly of claim 41 wherein the at least one other device may comprise at least one of: a personal computer, a palm top computer, another tool assembly, and a top of well device.

44. The tool assembly of claim 32 wherein the computing unit is further configured to transmit the data signals over a communication network to a remote location at predetermined intervals.

45. The tool assembly of claim 1 further configured for monitoring water quality in at least one of: ground water, surface water, and a flow cell.

46. A multi-parameter monitoring tool assembly, comprising:

a sensor head configured with a plurality of sensor ports, where each of the plurality of sensor ports is configured to engage and interconnect with an interchangeable sensor head component; and

an electronics housing assembly comprising a plurality of housing layers, wherein one or more of the layers are connectable to the sensor head, said electronics housing configured to enclose at least one electrical component which is electrically connectable to any of the interchangeable sensor head components engaged and interconnected with the sensor head.

47. The tool assembly of claim 46 wherein the plurality of housing layers comprise an inner housing and an outer housing where both the inner and outer housing are connectable to the sensor head,

48. The tool assembly of claim 47 wherein both the outer and inner housings are substantially cylindrical in shape, and the inner housing is configured to fit within the outer housing and both the inner and outer housing are configured to engage the first sensor head wherein a volume with the inner housing is environmentally sealed.

49. The tool assembly of claim 48 wherein the outer housing is configured with an inner diameter at one end sized such that upon insertion of a portion of the sensor head in the one end of the outer housing, engagement between the outer housing and the sensor head occurs through compression of a radially compressive sealing device encircling an exterior portion of the sensor head against an inner surface of the outer housing.

50. The tool assembly of claim 49 wherein the environmental seal is further provided through compression of a flat compression gasket between the one end of the outer housing and the sensor head.

51. The tool assembly of claim 48 wherein the inner housing includes a first threaded portion at one end of the inner housing where engagement between the inner housing and sensor head occurs through interaction with a mating threaded portion includable on the sensor head.

52. The tool assembly of claim 47 wherein the outer housing may be constructed of at least one of: a plastic material and a metallic material.

53. The tool assembly of claim 46 wherein the outer and inner housings are further configured to engage a removable backshell so as to establish an environmental seal.

54. The tool assembly of claim 52 wherein the outer housing is configured with an inner diameter at one end sized such that upon insertion of a portion of the removable backshell in the one end of the outer housing, engagement between the outer housing and the sensor head occurs through compression of a radially compressive sealing device encircling an exterior portion of the removable backshell against an inner surface of the outer housing.

55. The tool assembly of claim 54 wherein the environmental seal is further provided through compression of a flat compression gasket between the one end of the outer housing and the sensor head.

56. The tool assembly of claim 53 wherein the inner housing includes a threaded portion at one end of the inner housing where engagement between the inner housing and the removable backshell occurs through interaction with a mating threaded portion includable on the removable backshell.

57. The tool assembly of claim 53 further comprising at least one of:

the removable back shell configured for accessing replaceable batteries locatable within the electronic housing which are employed as a power source for the at least one electrical component; and

a data quick-connect device connectable and disconnectable to the removable backshell in manner which does not interrupt power to electronics locatable within the electronics housing, wherein the data quick-connect device provides a data connection to at least one remote location.

58. The tool assembly of claim 57 wherein the removable backshell includes first and second threaded portions, wherein the first threaded portion is employable for engaging a portion of the electronics housing and the second threaded portion is employable for engaging the data quick-connect device.

59. The tool assembly of claim 47 wherein an electrical connection between the removable back shell and the data quick-connect is established through application of a compressive force between a multiple elastomeric connector positionable within the

removable back shell and a printed circuit board positionable within the data quick-connect.

60. The tool assembly of claim 46 further configured for monitoring water quality in at least one of: ground water, surface water and a flow cell.

61. The tool assembly of claim 47 wherein the inner housing may be configured with an inner diameter sized so as to provide structural support for at least one component extending from a portion of the sensor within the electronics housing.

62. An electronics housing assembly, comprising:

an electronics housing configured to enclose at least one electronic component and at least one replaceable power source;

a removable backshell connectable to the electronics housing which is removable to provide access to the replaceable power source, the removable backshell further configured to receive at least one electrode device which provides for conduction of power and data signals to the at least one electronic component; and

a data quickconnect device connectable to the removable backshell and the at least one electrode device so as to provide data communications between a remote data source and the at least one electronic component, wherein the data quick connect is further configured to be removable from the removable backshell so as not to interrupt power between the portable power source and the at least one electronic component.

63. The tool assembly of claim 62 wherein the removable back shell includes first and second threaded portions, wherein the first threaded portion is configured for engaging a portion of the electronics housing portion and the second threaded portion is configured for engaging a mating threaded portion on the data quick-connect device.

64. The tool assembly of claim 63 wherein an electrical connection between the at least one electrode device and the data quick-connect is established through application of a compressive force between multiple elastomeric connectors included in the electrode device and at least one printed circuit board positionable within the data quick-connect.

65. The tool assembly of claim 62 wherein the electronics housing portion comprises a plurality of housing layers each of which is configured to connect with the removable backshell.

66. The tool assembly of claim 62 wherein the electronics housing comprises an inner housing and an outer housing configured to engage the removable backshell so as to establish an environmental seal.

67. The tool assembly of claim 65 wherein the engagement of the outer housing occurs through compression of an radially compressive sealing device encircling an exterior portion of the removable backshell against an inner cylindrical surface of the

outer housing, and engagement of the inner housing occurs through interaction of mating threaded portions on each of the inner housing and the removable backshell.

68. The tool assembly of claim 67 wherein the environmental seal is further provided through compression of a flat compression gasket positionable between one end of the outer housing and the removable backshell.

69. The tool assembly of claim 62 wherein the data quick connect device is further configured with a fluid pathway for providing atmospheric pressure to an inner volume of the electronic housing.

70. The tool assembly of claim 62 further configured as a multiparameter monitoring tool assembly.

71. The tool assembly of claim 70 wherein the electronics housing portion is further configured to connect with a sensor head configured with a plurality of sensor ports, where each of the plurality of sensor ports is configured to engage and interconnect with an interchangeable sensor head component.

72. The tool assembly of claim 70 wherein the multiparameter tool assembly is configured for monitoring water quality in at least one of: ground water, surface water, and a flow cell.

73. A connector assembly connectable to a housing of an electronic assembly comprising:

a removable backshell connectable to a portion of an electronics housing, the removable backshell is configured to provide access to a replaceable power source within the housing, wherein the removable backshell is further configured to include an electrode device connectable to the replaceable power source, the electrode device further configured to conduct power and data signals to at least one electronic component locatable within the housing; and

a data quickconnect device connectable to the removable backshell so at provide an electrical connection between a remote data source and the at least one electrode device so as to establish a data connection between the remote data source and the at least one electronic component, wherein the data quick connect is further configured to be removable from the removable backshell in a manner which does not interrupt power between the replaceable power source and the at least one electronic component.

74. The tool assembly of claim 73 wherein the removable back shell includes first and second threaded portions, wherein the first threaded portion is configured for engaging a portion of the housing portion and the second threaded portion is configured for engaging the data quick-connect device.

75. The tool assembly of claim 74 wherein the electrode device comprises an elastomeric connector positionable within the removable backshell and at least one connector ribbon configured to carry power signals from the replaceable power source and data signals from the data quickconnect to the at least one electronic component.

76. The tool assembly of claim 75 wherein an electrical connection between the electrode device positioned within the removable back shell and the data quick-connect is established through application of a compressive force between the multiple elastomeric connector and at least one printed circuit board positionable within the data quick-connect.

77. The tool assembly of claim 73 wherein the removable backshell is further configured to connect with the housing portion, where the housing portion includes a plurality of housing layers.

78. The tool assembly of claim 77 wherein the removable backshell is further configured to connect with each of an inner housing and an outer housing included in the housing portion so as to create an environmental seal.

79. The tool assembly of claim 78 wherein the removable backshell is substantially cylindrical in shape and is further configured to include at least one of: at least one radially compressive sealing encircling an exterior portion for the removable backshell and a threaded portion for engagement of a mating threaded portion.

80. The tool assembly of claim 79 wherein the engagement of the outer housing occurs through compression of the at least one O-ring encircling the exterior portion of the removable backshell against an inner cylindrical surface of the outer housing, and engagement of the inner housing occurs through interaction of the mating threaded portions on each of the inner housing and the removable backshell.

81. The tool assembly of claim 80 wherein the environmental seal is further provided through compression of a flat compression gasket positionable between one end of the outer housing and the removable backshell.

82. The tool assembly of claim 73 wherein the data quick connect device is further configured with a fluid pathway for providing atmospheric pressure to an inner volume of the electronic housing.

83. A monitoring tool assembly comprising:

a housing configured to enclose at least one electronic component within an interior volume, wherein the housing is further configured to be connectable to at least one fluid pathway so as to provide atmospheric pressure within the interior volume; and

a barometric pressure sensor positionable within the housing which is configured for providing barometric pressure readings.

84. The tool assembly of claim 83 wherein the barometric sensor is mountable on the at least one electronic component.

85. The tool assembly of claim 84 wherein the at least one electronic component comprises a circuit card device.

86. The tool assembly of claim 83 wherein the at least one fluid pathway is incorporated as part of a data communications lines which are connectable to the housing.

87. The tool assembly of claim 83 wherein the at least one fluid pathway is incorporated as part of a data quick connect device configurable to connect to and disconnect from the electronics housing.

88. The tool assembly of claim 83 further configured such that the electronics housing is completely submergible in at least one of: ground water and surface water, while the barometric pressure is taken.

89. The tool assembly of claim 83 wherein the barometric sensor is electrically connectable to a microprocessor device, said microprocessor is further connectable to at least one other sensor wherein the barometric pressure readings provided by the barometric pressure are employable in processing measurements generated by the at least one of: dissolved oxygen sensor and a water level sensor.

90. A method of measuring barometric pressure comprising the steps of:

providing atmospheric pressure to an enclosed volume within an electronics housing, wherein the electronics housing and at least one electronic component located therein are configured to monitor at least one parameter; and

measuring barometric pressure within the enclosed volume of the electronics housing.

91. The method of claim 90 further comprising the step of submerging the electronics housing in at least one of: ground water and surface water, while the barometric pressure is measured.

92. The method of claim 90 further comprising the step of employing the measured barometric pressure in the monitoring of the at least one parameter.

93. The method of claim 92 wherein the at least one parameter includes at least one of: dissolved oxygen and a water level.